

SEISMIC SAFETY COMMISSION

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September 15, 1993

Mr. Steve Yaeger
Deputy Executive Officer
Bay-Delta Oversight Council
1416 Ninth Street, #1306-3
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Dear Mr. Yaeger:

Thank you for the opportunity to review the draft document entitled *Briefing Paper on the Delta Levees*. The following comments are those of the Commission staff and focus on the section in the document that addresses seismic stability issues for the Sacramento-San Joaquin Delta Levees. We believe the Delta area's vulnerability to earthquake damage must be considered seriously as you address existing and future development, water transport and other safety issues.

The briefing paper can be read to imply that earthquakes are not a concern. It states on page 1, paragraph three, that "there is no record of a levee failure, or even significant damage to a levee as a result of earthquake shaking." However, information presented in a February, 1985 issue of *California Geology* (pp. 39-44) does identify some revealing facts regarding damage to Delta levee vulnerability due to earthquake shaking:

- Several bridge embankments in the Delta failed along Middle, San Joaquin, and Mokelumne Rivers during the 1906 earthquake. These embankments were similar in composition to the present Delta levees but not as high.
- The 1906 earthquake may have weakened the Delta levees leading to extensive failures throughout the levee system during the flood of 1907.
- The 1983 Coalinga earthquake damaged several levees. This damage was described as "cracking" of levees. One feature was 1000 foot in length, 3 to 10 feet wide, and 10 to 15 foot deep. The Coalinga epicenter was 150 miles from the damaged levee.

DEPARTMENT OF
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- The Coyote Lake (1979), Livermore (1980),
Pittsburg (1983), and the Morgan Hill (1984)
earthquakes also apparently damaged levees in the
Delta.

The earthquakes cited above were either small magnitude local events or distant earthquakes of moderate size. The damage caused by these earthquakes reinforces the information presented in the estimated levee damage susceptibility maps presented in Figures 8-2 and 8-6 of the August, 1992 Department of Water Resources report, "Seismic Stability Evaluation of the Sacramento-San Joaquin Delta Levees." Large "distant" earthquakes on the San Andreas, Hayward, Rogers Creek, or Calaveras and close by earthquakes along the coast range/Sierra Nevada boundary zone remain plausible hazards. Amplification factors of 1.0 and 1.6 are realistic estimates for the Delta where extensive levee damage is likely from moderate to strong ground shaking. The risk to development on or behind levees from ground failure and shaking should also be considered.

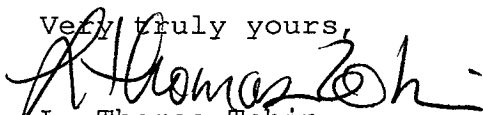
We strongly recommend that you address the implications of seismic hazards in the Delta on existing and future developments. You should identify areas expected to experience the strongest earthquake ground motion and ground failure and the implications of levee failure on land uses, the environment and fresh water transport.

We also recommend that you call for an overall earthquake emergency response and recovery plan. It should include procedures for rapidly coping with levee failures following a major distant or local earthquake. It also should clearly specify which organizations are responsible for repair of the Delta levees after a destructive earthquake. Several counties, the Corps of Engineers, the Department of Water Resources, local governments, and others all share various overlapping responsibilities for levees in the Delta. If a major earthquake destroys a portion of the levee system, it is unclear what organization would take the lead in repair efforts.

The Commission has not spent much time on the Delta due to other priorities and therefore cannot prepare a "perspective paper" at this time. We will, however, assist you any way it can in gathering seismic and geotechnical data regarding the Delta, working with someone who could write such a paper, and recommend the appropriate experts to review reports or advise the Council.

Should you need any additional assistance, please give contact Mr. Richard McCarthy of my staff.

Very truly yours,


L. Thomas Tobin
Executive Director